SOLAR OBSERVATIONS

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SOLAR RADIATION OBSERVATIONS, MARCH 1939

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Measurements of solar radiant energy received at the surface of the earth are made at eight stations maintained by the Weather Bureau, and at nine cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the MONTHLY WEATHER REVIEW, December 1937, pp. 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Madison and Lincoln the observations are made with the Marvin pyrheliometer; at Washington and Blue Hill they are obtained with a recording thermopile, checked by observations with a Marvin pyrheliometer at Washington and with a Smithsonian silver disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 8 a. m. (75th meridian time) and at noon (local mean solar time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

Direct radiation intensities averaged above normal for March at Washington and Lincoln, and slightly below normal at Madison.

Total solar and sky radiation was above normal at all stations with the exception of New York, Fresno, Riverside, Ithaca, and Newport.

No polarization observations were made during March.

TABLE 1.—*Solar radiation intensities during March 1939*

[Gram-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
WASHINGTON, D. C.											
Mar. 3	3.30				1.25						2.26
Mar. 7	2.62			1.00	1.26		1.23				2.26
Mar. 8	1.68						1.12				1.68
Mar. 9	4.75				.95						5.16
Mar. 10	3.15				.96						3.45
Mar. 14	3.63	0.82	0.90	.98	1.11						3.00
Mar. 16	3.81			1.00	1.20						3.15
Mar. 17	3.15	.92	1.02	1.16	1.28						1.78
Mar. 23	3.81	.51	.58	.81	1.00		1.08				3.99
Mar. 24	4.95				.91						5.79
Mar. 29	3.15				1.17						2.36
Means		.75	.83	.99	1.11		1.14				
Departures		−.01	+.03	+.03	+.02		0				
MADISON, WIS.											
Mar. 1	1.24	1.05	1.17	1.30	1.46						1.68
Mar. 9	3.00			.89	1.26						3.00
Mar. 16	.96	.99	1.11	1.24	1.42	1.62					1.45
Mar. 19	2.16	1.01	1.09	1.22	1.38						4.17
Mar. 20	3.63	.94	1.05	1.17	1.28						2.87
Mar. 22	4.17	.53	.65	.80	1.09	1.36					4.95
Mar. 23	6.27	.67	.77	.95	1.17						7.04
Mar. 30	3.81					1.55					3.63
Means		.86	.97	1.08	1.29	1.51					
Departures		−.02	−.04	−.07	−.02	−.06					
LINCOLN, NEBR.											
Mar. 1	1.68		1.12	1.27	1.42						2.26
Mar. 2	2.62		1.05	1.20	1.39		1.40	1.20	1.04	0.92	3.45
Mar. 6	1.60	0.89	1.05	1.29	1.42		1.37	1.21	1.04	.94	2.62
Mar. 7	2.26				1.28						3.45
Mar. 13	4.37		.91	1.02	1.02		1.25	1.00	.86	.72	4.95
Mar. 15	1.68	1.00	1.11	1.25	1.44				1.11	1.01	2.16
Mar. 18	2.36		1.00		1.27						2.49
Mar. 20	3.81		1.09	1.20	1.39		1.24	1.12	1.00	.86	3.45
Mar. 21	4.17				1.24		1.20	.95	.76	.64	5.36
Mar. 22	4.57		.70	.93	1.17		1.26	1.07	.86	.73	4.57
Mar. 30	3.63	.81	.84	.94	1.28	1.59	1.37	1.20			4.95
Means		.90	.99	1.14	1.30	(1.59)	1.30	1.11	.97	.86	
Departures		+.06	+.05	+.05	+.02	+.04	+.02	+.02	+.03	+.05	

*Extrapolated.

TABLE 2.—*Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Week beginning—	Washington	Madison	Lincoln	Chicago	New York	Fresno	Fairbanks	Twin Falls	La Jolla	Miami	New Orleans	Riverside	Blue Hill	San Juan	Friday Harbor	Ithaca	Newport
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Feb. 26	248	271	331	234	212	406	123	231	449	440	194	421	302	629	235	176	306
Mar 5	336	287	322	223	212	342	163	299	474	458	396	455	301	604	243	153	261
Mar. 12	351	397	394	353	239	498	249	314	263	378	500	469	335	637	178	202	334
Mar. 19	469	429	463	392	397	403	240	464	241	446	432	196	465	595	366	305	474
Mar. 26	288	389	314	249	244	415	286	419	450	485	401	366	294	673	332	137	325
DEPARTURES OF DAILY TOTALS FROM NORMALS																	
Feb. 26	−36	−3	+6	+28	−34	+15	−17	−63	+117	+64	−86	+39	−3	+70	+70	−46	+19
Mar. 5	+35	−15	−18	+8	−43	−44	+1	−35	+168	+76	+75	+39	−4	+20	+39	−72	−34
Mar. 12	+41	+77	+24	+124	−19	+82	+45	−13	−56	−42	+148	+53	+49	+47	−15	−6	+2
Mar. 19	+129	+108	+67	+140	+93	−44	+44	+82	−107	−13	+63	−180	+72	+3	+112	+17	+82
Mar. 26	−57	+32	−67	−3	−35	−72	−6	+60	+28	+24	+80	−35	−94	+84	+19	−122	−73
ACCUMULATED DEPARTURES SINCE JAN. 1																	
	+1,813	+1,414	+196	+2,681	+161	−1,029	−238	−973	+2,751	+1,666	+3,941	−819	−406	+3,940	+1,575	−2,296	−456